Determining Availablity Bias on Campus

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Will the nudge of asking students to think about their day in time increments make them recall more instances of stress in a day?

Study Design

The experimental units in our study are MA students who responded to our email asking if they would like to take part in our study. We have 27 experimental units in our study.

There are two variables for the data: the type of test (nudge), and the number of instances of stress they record.

Parameter of interest (μ): the long-run mean difference in the number of events between the group who was reminded of all times of day and the group who was not reminded.

H_0: People who are reminded to think about times of the day will not think of more instances of stress compared to people who are not asked to think of times of day.

H_a: People who are reminded to think about times of the day will think of more instances of stress compared to people who are not asked to think of times of day.

$$\mu_1 = \text{group without nudge}$$

$$\mu_2 = \text{group with nudge}$$

$$H_0 : \mu_1 = \mu_2$$

$$H_a : \mu_1 < \mu_2$$

Explore Data

```
data <- read_csv(here("stats/nudge_final/data.csv"), show_col_types = F)
nudge_mean <- mean(data$nudge, na.rm = T)
no_nudge_mean <- mean(data$no_nudge)
sample_stat <- nudge_mean - no_nudge_mean
data
```

```
## # A tibble: 14 x 2
##    no_nudge nudge
##       <dbl> <dbl>
```

```
##  1        2     5
##  2        2     6
##  3        1     7
##  4        1     7
##  5        3     6
##  6        4     7
##  7        4     4
##  8        4     4
##  9        3     5
## 10        5     5
## 11        3     6
## 12        2     3
## 13       10     5
## 14        3    NA
```

Our sample size is 27. Our sample statistic (difference in means) is 2.027.

Draw Inferences

In order to simulate data and test our null hypothesis, we need to use 27 cards, each of them representing a person's score (the number of instances they record). We would then randomize the cards and place them into two piles of sizes 14 and 13. These piles represent our different groups. We will then take the means of the two groups and draw a dot plot representing the difference in means. After doing this many times, we would see where are sample statistic falls in the t-distribution.

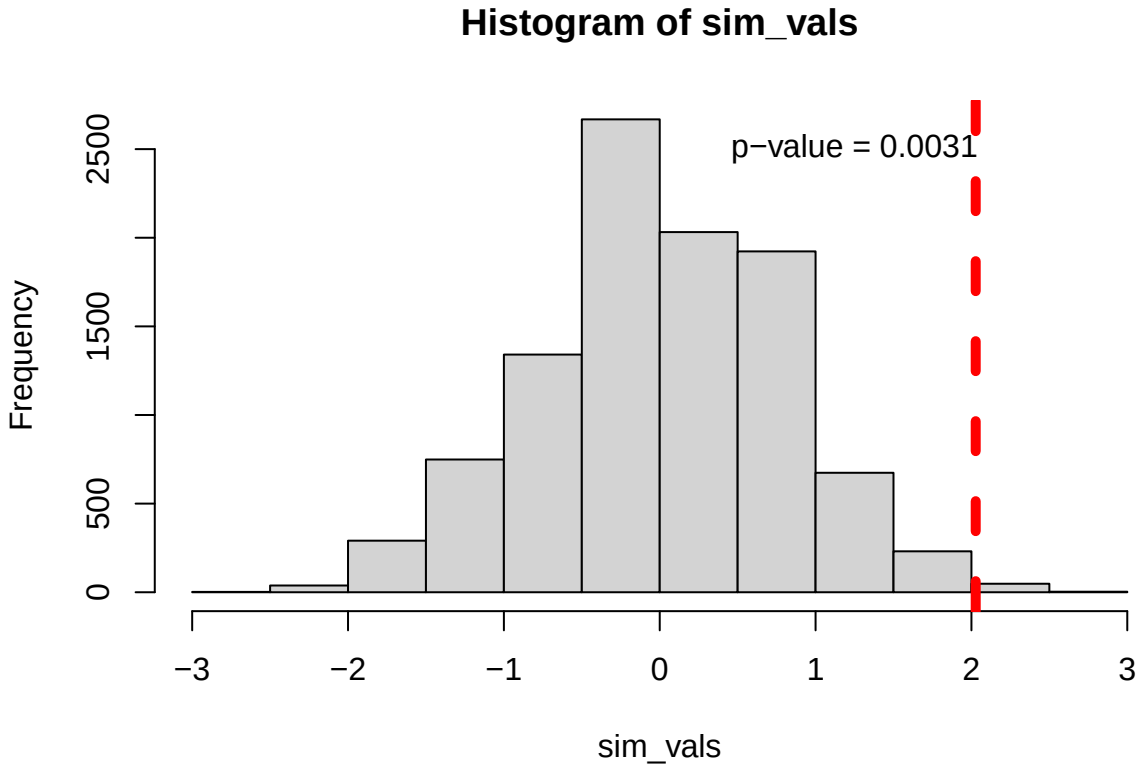
```
all_vals <- c(data$no_nudge, data$nudge)
all_vals <- all_vals[!is.na(all_vals)]

simulation <- function(all_vals) {
  shuffle <- sample(all_vals)
  no_nudge_sim <- shuffle[1:14]
  nudge_sim <- shuffle[15:27]
  difference <- mean(nudge_sim) - mean(no_nudge_sim)
  difference
}

sim_vals <- replicate(10000, simulation(all_vals))

p_value <- sum(sim_vals > sample_stat) / length(sim_vals)

hist(sim_vals)
abline(v = sample_stat, col = "red", lwd = 5, lty = "dashed")
text(x = 1.25, y = 2500, paste("p-value =", p_value))
```



Our p-value is 0.0031, which means that if the true difference in means between the two groups is 0, there is a 0.31% chance of seeing our observed difference in means.

```
null_sd <- sd(sim_vals)
null_mean <- mean(sim_vals)

t_score <- (sample_stat - null_mean) / null_sd
t_score
```

```
## [1] 2.515261
```

Our observed statistic is 2.5153 standard deviations away from the mean of the null distribution.

```
t.test(data$nudge, data$no_nudge)
```

```
##
##  Welch Two Sample t-test
##
## data:  data$nudge and data$no_nudge
## t = 2.9246, df = 20.767, p-value = 0.008163
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.5847761 3.4701690
## sample estimates:
## mean of x mean of y
##  5.384615  3.357143
```

The validity conditions are *mostly* met for the theory-based method (t test) because we have at least 10 observations in each group. There was one outlier in the not nudge group, which does make our p-values between the theory-based and simulation methods a little different.

Both the theory-based and simulated p-value are very small, so they are both suitable in this experiment.

The theory-based p-value might be biased since there is one outlier in the no nudge group.

Conclusions

Because our p-value is very low (0.003) and our t-score is relatively high (2.5153), we conclude that it is very unlikely that the true mean scores between our groups are equal. This means that showing participants times of the day will make them think of more instances of stress.

When asking people to reflect on the past, we found that it is important to ask them about specific times of the day to reduce the impact of availability bias.

Look Back and Ahead

In the future, we could look at how age, gender, courseload affect our results. There are other covariates that we could also have an impact on people's ability to remember events further in the past.

Our new research question: Will the nudge of asking students to think about their day in time increments make them recall more instances of happiness in a day? We believe that asking people about a different emotion might change our results—people might be more likely to remember positive experiences than negative ones.